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SITE INVESTIGATION

463

PROPOSED RESIDENTIAL DEVELOPMENT
MOANALUA, OAHU, HAWAII

FOR

ALBERT C. KOBAYASHI

Dames & Moore Job No. 7581-002-11

MUNICIPAL REFERENCE & RECORDS CENTER

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April 28, 1972

Mr. Albert C. Kobayashi
2646 Kilihau Street
Honolulu, Hawaii 96819

Dear Mr. Kobayashi:

Submitted herewith are four copies of our report titled "Site Investigation, Proposed Residential Development, Moanalua, Oahu, Hawaii, for Albert C. Kobayashi."

This investigation was performed in general accordance with the scope of work defined in our confirming proposal dated February 18, 1972. We were authorized to perform this investigation by your signed acceptance of our proposal on March 31, 1972.

Preliminary recommendations for the proposed residential development were discussed with Mr. Carl Marrero, your designer, on April 27, 1972 prior to finalizing this report.

Soil and rock samples obtained during the field exploration which were not destroyed during laboratory testing are being stored for possible future examination and inspection. Unless requested otherwise, these samples will be discarded in six months following the date of this report.

It has been a pleasure performing this assignment for you. Should you have any questions regarding the contents of this report, please contact us for clarification.

Yours very truly,

DAMES & MOORE

Howard Schirmer, Jr.
Howard Schirmer, Jr.

HAS WDW mw

SITE INVESTIGATION
PROPOSED RESIDENTIAL DEVELOPMENT
MOANALUA, OAHU, HAWAII
FOR
ALBERT C. KOBAYASHI

INTRODUCTION

This report presents the results of our site investigation for 16 lots designated by Tax Key Numbers 1-1-45-108 through 1-1-45-121, 1-1-44-69 and 1-1-44-70, Moanalua, Oahu, Hawaii. The site is approximately 200 feet by 1000 feet in size and is located adjacent to the north side of Ala Lani Street in Moanalua Valley. The physiographic location of the site with respect to existing streets and landmarks is shown on the Map of Area, Plate 1. The site is shown in greater detail on the Geologic Map, Plate 2.

The purpose of this investigation was to provide recommendations to aid in design and construction of the proposed development based on the existing surface and subsurface conditions encountered at the site. Detailed descriptions of the field exploration and laboratory testing which were performed during the course of this investigation are appended to this report.

PROJECT CONSIDERATIONS

We understand that the proposed development will include construction of one single-family dwelling on each of 16 lots. The houses will be constructed on two different levels. The garage portion of each house will be constructed slightly above street level; the living area of each house will be built at an elevation approximately eight feet above the garage level.

In order to construct the buildings at their planned grades, a considerable amount of excavation will be required. Based on current plans, maximum vertical cut depths for each lot are anticipated to range from about 12 feet to 40 feet.

SITE CONDITIONS

GEOLOGY

The site is situated on the north side of Moanalua Valley where the geology is dominated by the basalts of the Koolau volcanic series. The Koolau basalts form the Koolau Range which comprises the majority of eastern Oahu. These basalts consist of both pahoehoe and aa flows commonly interlayered with soil horizons derived from basalt and weathered in place during the time intervals between flows.

After cessation of volcanic activity, Moanalua Valley was cut into the slope of the Koolau dome by stream action and weathering. During this period of stream cutting,

there were numerous fluctuations in sea level which had the effect of causing the valley to be cut deeper as sea level subsided and then to be refilled with slope wash and stream deposits as sea level rose again.

SURFACE CONDITIONS

The site is located on the slope of a ridge bearing generally east-west. The topography of the site consists of moderate to steep slopes ranging generally from $1\frac{1}{2}$ on the horizontal to 1 on the vertical ($1\frac{1}{2}$:1) to practically vertical. Surface elevations range from approximately +255 feet* to +275 feet along the southern site boundary adjacent to Ala Lani Street to greater than +350 feet along the site's northern boundary. Maximum elevation of the top of the ridge north of the site is about +640 feet. It is believed that much of the immediate site topography is the result of previous excavation; during initial grading of the subdivision, some borrow may have been accomplished from the southern portion of the site in order to construct the embankment for Ala Lani Street.

The entire site except for the very steep cliffs of exposed basalt is covered by brush, weeds and grass. The vegetation grows on what is believed to be a thin mantle of surficial soil of slope wash origin.

*Elevations presented in this report are referenced to Mean Lower Low Water Datum.

Other than erosion in some localized areas, no major slope stability problems were evident at the site. There is some indication, however, that downhill creep of the soil cover might be taking place at a very slow rate. The velocity of the creep is probably restricted by the relatively dense vegetation which exists on the slopes.

A concrete rubble masonry wall running parallel to Ala Lani Street is located approximately 85 feet north of the site's southern limits as shown on Plate 2. A paved ditch exists immediately uphill of the base of the wall. The wall and ditch serve as an effective inhibitor of downslope erosion and as a catchment for small rolling rocks and boulders. A chain link fence is located along about the western one-third of the southern boundary of the property. This fence also serves as a barrier for rocks rolling from uphill slopes.

SUBSURFACE CONDITIONS

The subsurface conditions at the site were investigated by drilling four borings ranging in depth from 11.0 feet to 18.0 feet under the technical supervision of our engineering geologist. The locations at which the borings were drilled are depicted on the Geologic Map, Plate 2, which also shows the approximate horizontal distribution of the surface materials at the site. The exploration was

augmented by site reconnaissance performed by our engineering geologist.

The subsurface exploration revealed that at the locations of the borings the site is mantled by approximately 4 to 8 feet of clayey silt and silty clay containing occasional basaltic gravel, cobbles and boulders. The surficial soils are underlain by moderately- to highly-fractured vesicular basalt. It is anticipated that the depth of surficial soil is considerably less on steeper slopes which extend toward the northern limits of the property.

No ground water was encountered in any of the borings drilled during the field exploration.

DISCUSSIONS AND RECOMMENDATIONS

GENERAL

It is believed that the site is suitable for the proposed single-family housing; however, it will be difficult to grade for development. Due to the steep site topography, a large amount of excavation will be required in order to construct the proposed houses at their planned elevations. It is anticipated that the majority of the excavation will extend through massive unweathered basaltic bedrock and some blasting may be required. Precautions to reduce the likelihood of downslope boulder movements will be necessary.

EXCAVATION

In view of the extensive degree of fracturing and jointing of the basalt bedrock encountered in the borings drilled during this investigation, it is recommended that excavation in rock be constructed on slopes not steeper than $\frac{1}{2}$ on the horizontal to 1 on the vertical ($\frac{1}{2}:1$).

Similarly, slopes in soil should not be constructed steeper than 2 on the horizontal to 1 on the vertical (2:1).

Retaining walls may be utilized in instances where excavation at the above recommended cut slopes cannot be obtained. Following excavation, all soil covered slopes should be planted as soon as possible in order to control surface erosion.

It is believed that excavation of surficial soils may be accomplished with conventional hand and mechanical earthmoving equipment. However, in view of the steepness of the existing topography, the use of large earthmoving equipment will probably be difficult. Blasting and/or drilling techniques will be required for excavation in basaltic bedrock in many areas. Prior to lot grading, higher areas containing loose rock should be remedied to reduce the likelihood of boulders moving down the slope.

FILL

Based on preliminary plans for the proposed development, it is not anticipated that an appreciable amount of fill will be required during construction. Surficial reddish brown clayey sandy silt such as that encountered in Borings 2, 3 and 4 may be utilized in fills if required. This material typically contains partially- to highly-weathered basaltic cobbles and boulders. Rock sizes greater than three inches in maximum dimension should be selectively removed from the excavated material prior to fill placement. All fills should be placed in horizontal compacted lifts not exceeding six inches. Fills should be compacted to a minimum of 90 percent of the material's maximum dry density as determined by the AASHTO designation T-180 test procedure.

Laboratory tests performed on samples of surficial soils located in the eastern portion of the site indicate that they are potentially expansive. These soils consist of gray to dark brown silty clay similar to that encountered in Boring 1. It is recommended that such materials not be incorporated into structural fills. A qualified soils engineer should inspect and approve the use of all fill materials proposed for use as fill material prior to its placement.

FOUNDATIONS

In order to preclude movement of the proposed structures due to possible downhill creep of soils overlying basaltic bedrock, it is recommended that foundations of proposed houses and retaining walls be based on basaltic bedrock. Foundations may consist of spread footings designed utilizing an allowable bearing pressure of 5000 pounds per square foot. Footings for proposed houses should be a minimum width of 18 inches.

POTENTIAL HAZARDS DUE TO FALLING ROCK

Based upon discussions with residents of dwellings located near the site, cobbles and boulders occasionally fall from the exposed natural rock faces located north of and above the site. To reduce the risk of damage to life and property caused by falling rock, it is recommended that a chain link fence be constructed at the crest of cut slopes excavated during the planned development in order to act as a barrier for rocks rolling downhill. Stressed cables may be incorporated with the chain link fence in order to afford resistance of impact due to uncommonly large rolling boulders.

As an added precaution, all potentially hazardous loose cobbles and boulders should be removed from the natural slopes above the site. It is our opinion that the scaling

operations may be accomplished generally by means of hand labor. Blasting may be necessary to reduce the size of large boulders. Chain link fence netting may be utilized around the rock during blasting. All material removal should be first conducted at higher elevations, working downward to avoid covering an area more than once.

LIMITATIONS TO INVESTIGATION

Recommendations presented in this report are based upon subsurface conditions encountered in the borings drilled during this investigation and upon our geological reconnaissance of the site. Should different soil conditions be encountered during construction, the soils engineer should be consulted and appropriate design modifications implemented, if necessary. It is recommended that all cut slopes and foundation excavations be inspected and approved following their preparation in order to assure that the soil and rock conditions are of comparable competency to those encountered during this investigation and upon which the recommendations presented in this report are based.

The following Plates and Appendix are attached
and complete this report.

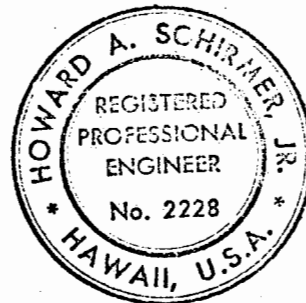
- Plate 1 - Map of Area
- Plate 2 - Geologic Map
- Appendix - Field Exploration and
Laboratory Testing

Respectfully submitted,

DAMES & MOORE

Howard Schirmer, Jr.
Howard Schirmer, Jr.

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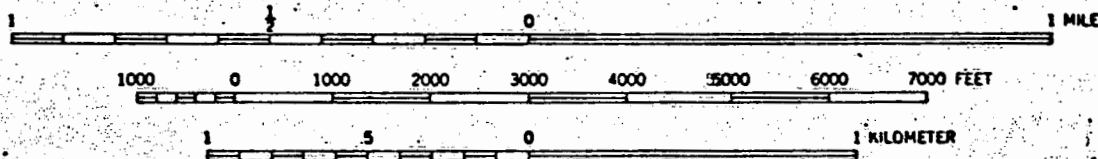
7581-002-11

GENERAL LOCATION OF SITE INVESTIGATED



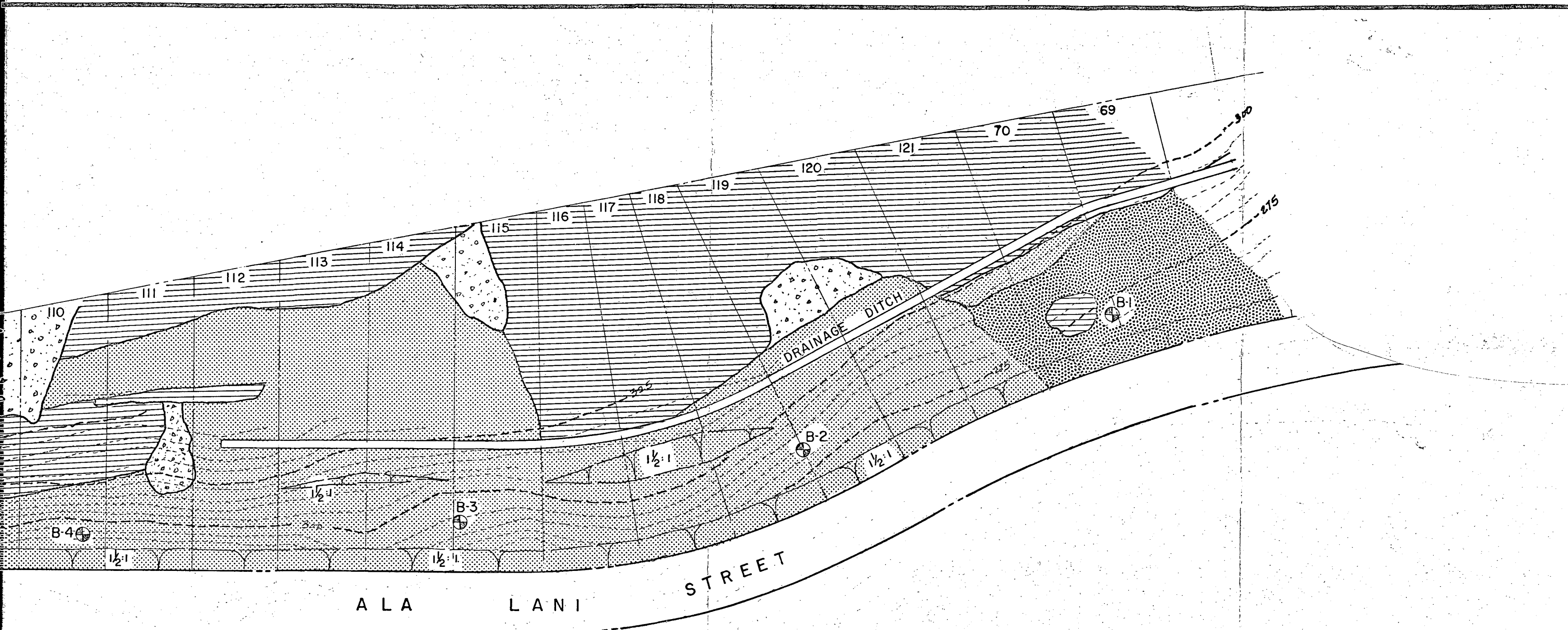
MAP OF AREA

SCALE 1:24000

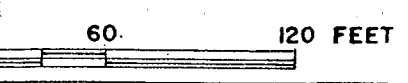


REFERENCE:
U.S.G.S. QUADRANGEL MAP
HONOLULU, HAWAII
DATED 1969






DAMES & MOORE



C MAP



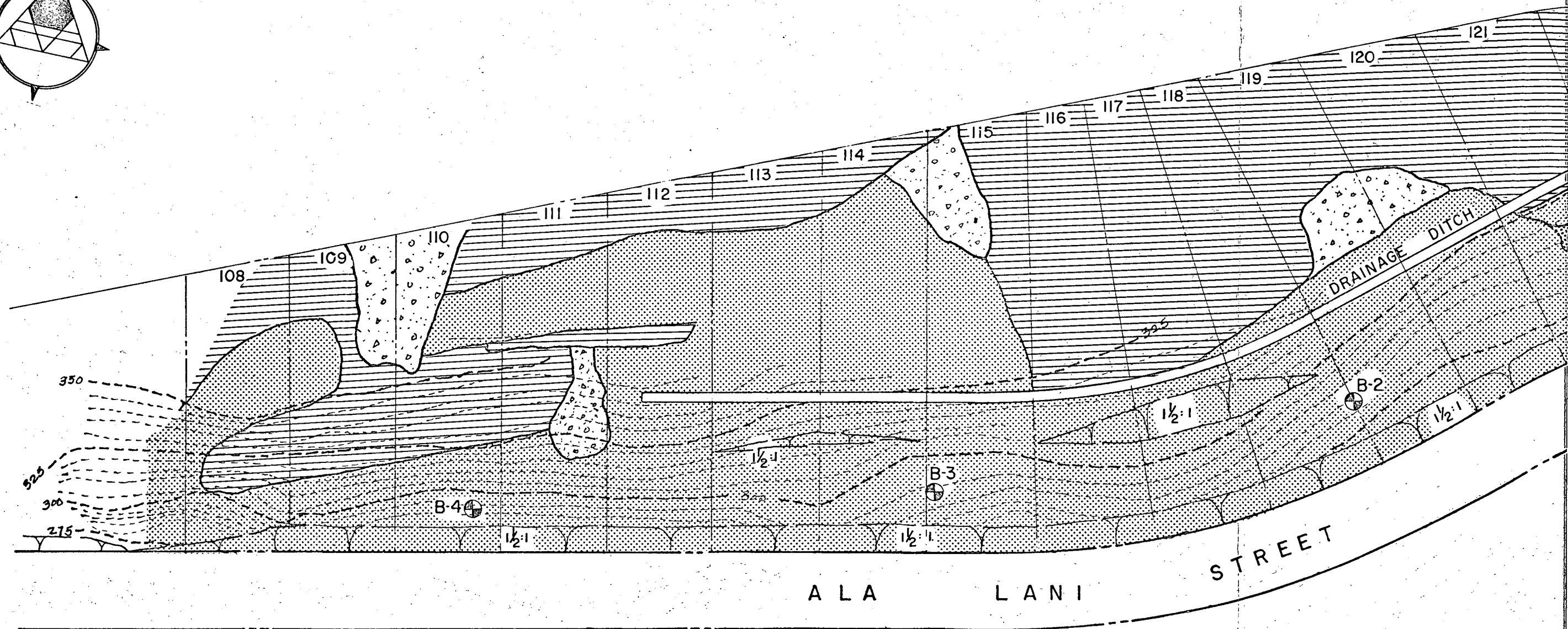
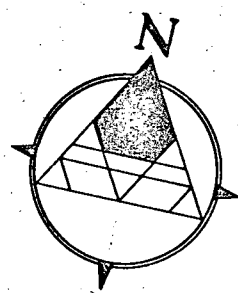
LEGEND

-  BASALT
-  BASALTIC COBBLES AND BOULDERS IN A PARTIALLY CEMENTED SILT AND CLAY MATRIX (SLOPE WASH DEPOSIT)
-  LOOSE BASALTIC COBBLES AND BOULDERS (TALUS)
-  REDDISH BROWN CLAYEY SILT WITH OCCASIONAL BASALTIC COBBLES AND BOULDERS
-  DAMES & MOORE BORING

REFERENCE

REVISED GRADING PLAN, SHT. 485,
MOANALUA VALLEY SUBDIVISION-UNIT B
BY SUNN, LOW, TOM & HARA, INC.
DATED 1-31-64

DAMES & MOORE



GEOLOGIC MAP

60 40 20 0 60 120 FEET

158 2 4 12
4-28-72

APPENDIX

FIELD EXPLORATION AND LABORATORY TESTING

FIELD EXPLORATION

The subsurface conditions at the site were investigated by drilling four borings ranging in depth from 11.0 feet to 18.0 feet at the locations depicted on Plate 2 in the body of this report. The borings were drilled with a skid-mounted Longyear Model 21 drilling rig utilizing rotary wash equipment. Four-inch diameter casing was used in Borings 2, 3 and 4 to prevent caving. Relatively undisturbed and disturbed samples of the subsurface soils were recovered using the Dames & Moore Type U sampler depicted on Exhibit A-1. Samples of basaltic bedrock were obtained using an NX double-tube core barrel.

The drilling operations were conducted under the technical supervision of one of our engineering geologists who assisted in obtaining samples of the subsurface materials. Our geologist maintained detailed logs of each boring and classified the materials encountered in accordance with the Unified Soil Classification System and pertinent geological descriptions. The Log of Borings is presented on Plates A-1A through A-1D. The Unified Soil Classification System is explained on Plate A-2.

LABORATORY TESTING

General - Selected undisturbed samples of the sub-surface soils recovered during the field exploration were subjected to laboratory tests in order to evaluate their engineering properties. The results of the laboratory tests and the procedures employed are presented in the remainder of this Appendix

Expansion Test - A near-surface soil sample obtained from Boring 1 was subjected to an expansion test to evaluate its expansive properties. The results of the expansion test are presented below.

<u>Boring No.</u>	<u>Depth (ft)</u>	<u>Surcharge (psf)</u>	<u>Percent Expansion</u>
1	0.8	200	6

Mechanical Analyses - Mechanical analyses were performed on two selected samples in order to determine their grain size distribution. The results of these tests are presented on Plate A-3, Gradation Curves.

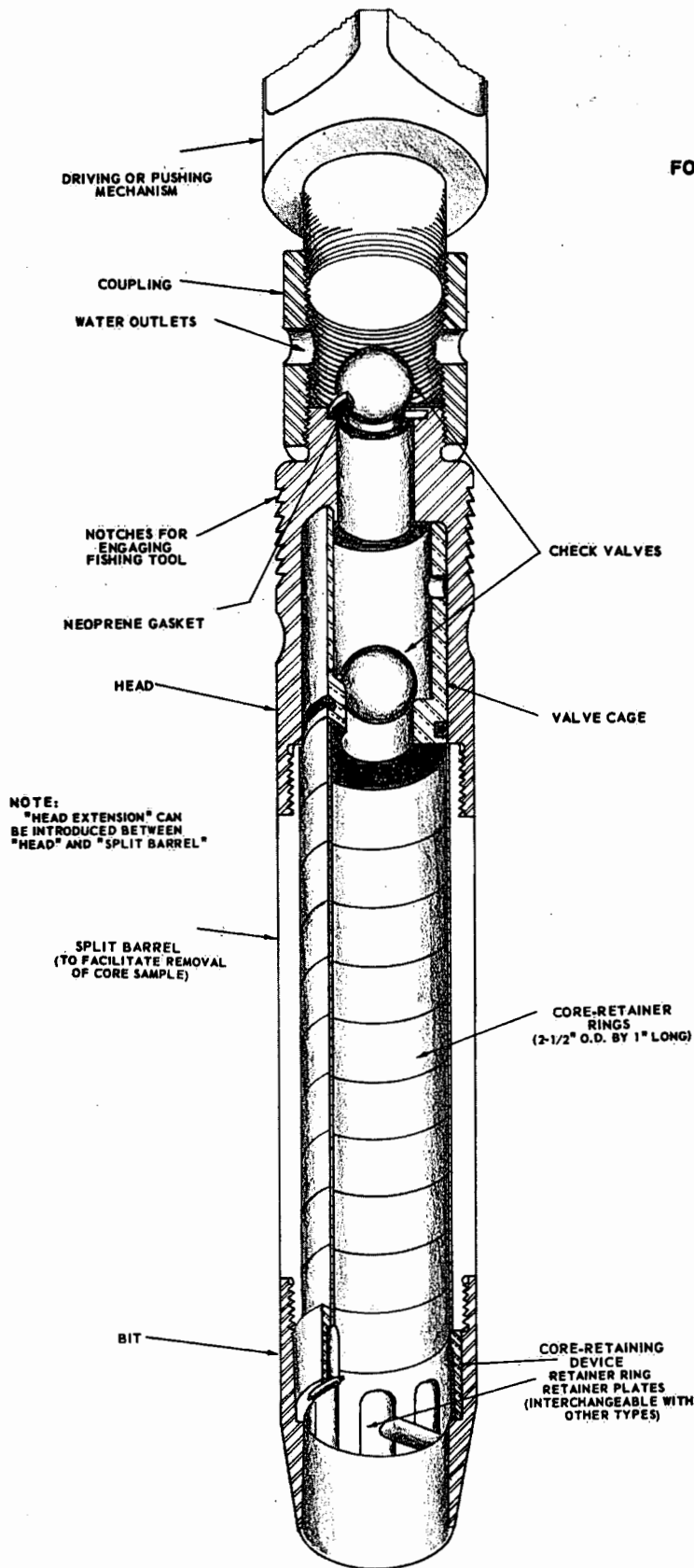
Moisture Content and Dry Density Determinations - Moisture content and dry density determinations were conducted on several undisturbed samples obtained from the borings. Results of these tests are presented on the Log of Borings at the appropriate depth of sample recovery.

The following Exhibits and Plates are attached
and complete this Appendix:

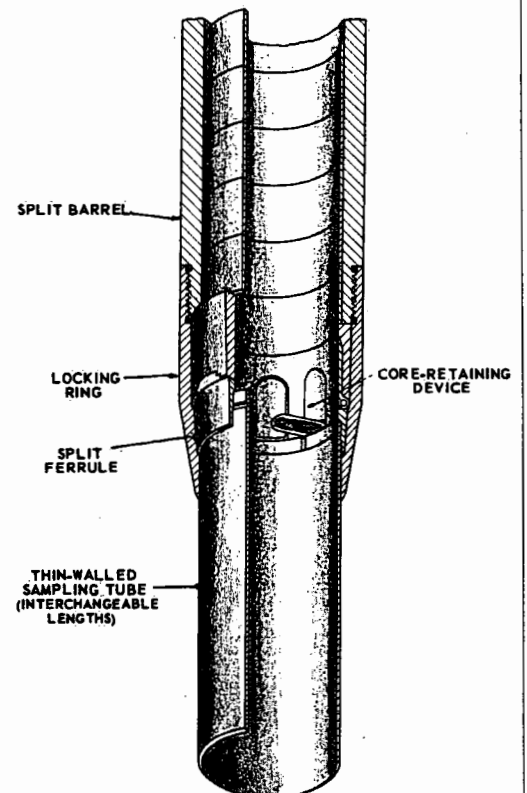
- Exhibit A-1 - Soil Sampler Type U
- Plate A-1A - Log of Borings, Boring 1
- Plate A-1B - Log of Borings, Boring 2
- Plate A-1C - Log of Borings, Boring 3
- Plate A-1D - Log of Borings, Boring 4
- Plate A-2 - Unified Soil Classification
System
- Plate A-3 - Gradation Curves

EXHIBIT A-1

SOIL SAMPLER TYPE U FOR SOILS DIFFICULT TO RETAIN IN SAMPLER



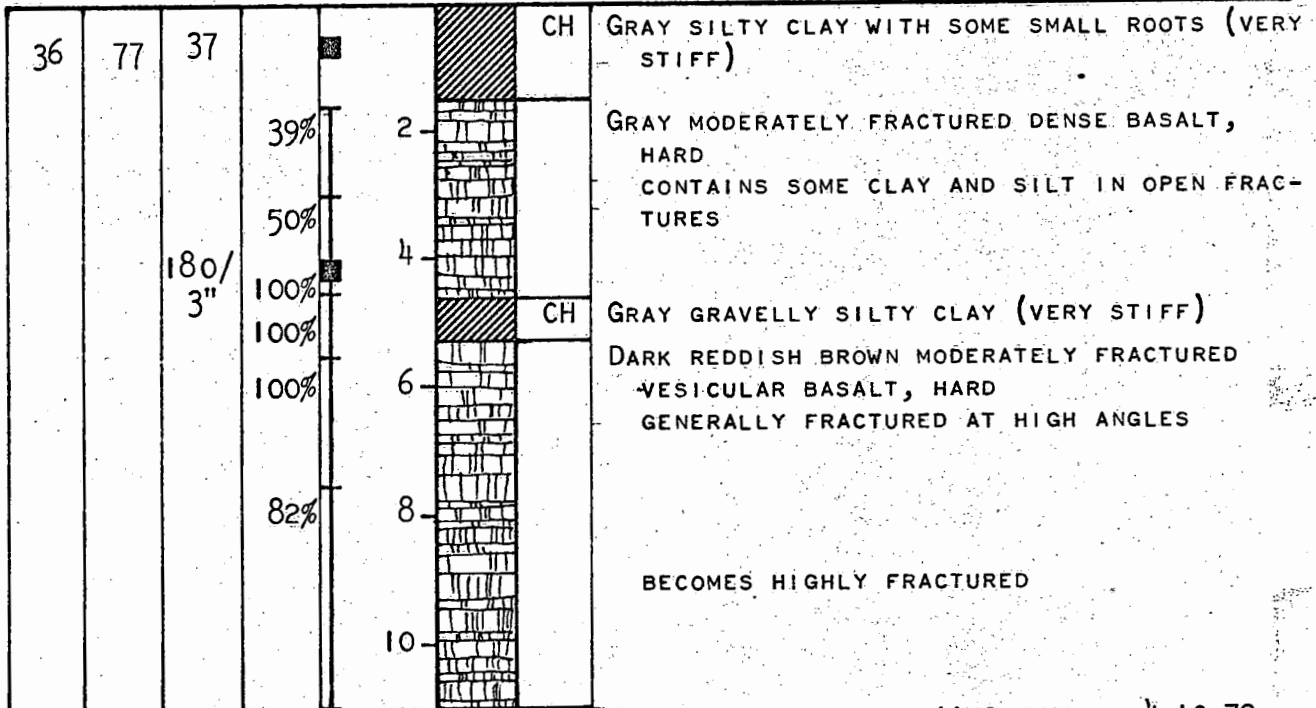
ALTERNATE ATTACHMENTS



BORING I

SURFACE ELEVATION 272 FEET

MOISTURE CONTENT IN %	DRY DENSITY IN PCF	BLOWS/FT. ON SAMPLER	CORE AND % RECOVERY	SAMPLES AND/OR CORES	DEPTH IN FEET	GRAPH SYMBOL	LETTER SYMBOL	DESCRIPTION
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BORING COMPLETED AT 11.0 FEET ON 4-10-72
NO GROUND WATER ENCOUNTERED

LOG OF BORINGS

NOTES:

- - DEPTH AT WHICH UNDISTURBED SAMPLE WAS TAKEN
 - ▣ - DEPTH AT WHICH DISTURBED SAMPLE WAS TAKEN
 - - DEPTH AT WHICH SAMPLE WAS LOST DURING EXTRACTION
 - I - DEPTH AND LENGTH OF CORE RUN
- DRIVING ENERGY - 140-LB WEIGHT DROPPING 30 INCHES

DAMES & MOORE
PLATE A-1A

REVISIONS
BY DATE

FILE 7581-002

CHECKED BY DATE 4-18-72
4-28-72

BORING 2

SURFACE ELEVATION 283 FEET

MOISTURE CONTENT IN %
 DRY DENSITY IN PCF
 BLOWS/FT. ON SAMPLER
 CORE AND % RECOVERY
 SAMPLES AND/OR CORES
 DEPTH IN FEET
 GRAPH SYMBOL
 LETTER SYMBOL

DESCRIPTION

24	94	34			MH	REDDISH BROWN GRAVELLY SANDY CLAYEY SILT (VERY STIFF)
				2		
				4		BASALTIC BOULDER AT 3 FEET TO 4 FEET
37	69	21				GRADES MORE GRAVELLY
				6		
		60%				OLIVE GREEN HIGHLY FRACTURED AND WEATHERED
		45%		8		VESICULAR BASALT, HARD
						CONTAINS LIMONITE STAINS ON FRACTURES AND
		17%		10		VESICULE SURFACES
		36 1/6"			MH	GRAY CLAYEY SILT (SOFT)
				12		GRAY MODERATELY FRACTURED VESICULAR BASALT

BORING COMPLETED AT 12.3 FEET ON 4-11-72
 NO GROUND WATER ENCOUNTERED

LOG OF BORINGS

NOTES:

- -DEPTH AT WHICH UNDISTURBED SAMPLE WAS TAKEN
 - ⊠ -DEPTH AT WHICH DISTURBED SAMPLE WAS TAKEN
 - -DEPTH AT WHICH SAMPLE WAS LOST DURING EXTRACTION
 - I -DEPTH AND LENGTH OF CORE RUN
- DRIVING ENERGY - 140 -LB WEIGHT DROPPING 30 INCHES

DAMES & MOORE
PLATE A-18

REVISIONS

DATE

FILE

CHECKED BY WDW 4-28-72

CHECKED BY W/DW 4-28-72

SURFACE ELEVATION 293 FEET

DESCRIPTION

MOISTURE CONTENT IN %	DRY DENSITY IN PCF	BLOWS/FT. ON SAMPLER	CORE AND % RECOVERY	SAMPLES AND/OR CORES	DEPTH IN FEET	GRAPH SYMBOL	LETTER SYMBOL	DESCRIPTION
43	75	14			0		MH	REDDISH BROWN GRAVELLY SANDY CLAYEY SILT (STIFF)
		25			2			
					4			COLORS TO BROWN
39	82	15			6			
					8			GRAY MODERATELY TO HIGHLY VESICULAR BASALT, HARD
			92%		10			BECOMES HIGHLY FRACTURED AND WEATHERED WITH SOME CLAY AND SILT IN OPEN FRACTURES
			46%		12			BECOMES VESICULAR AND MODERATELY WEATHERED GENERALLY FRACTURED AT HIGH ANGLES
					14			COLORS TO REDDISH BROWN
			100%		16			
			80%		18			

BORING COMPLETED AT 18.0 FEET ON 4-13-72
NO GROUND WATER ENCOUNTERED

BORING COMPLETED AT 18.0 FEET ON 4-13-72
NO GROUND WATER ENCOUNTERED

LOG OF BORINGS

NOTES:

- ☒ -DEPTH AT WHICH UNDISTURBED SAMPLE WAS TAKEN
☒ -DEPTH AT WHICH DISTURBED SAMPLE WAS TAKEN
☐ -DEPTH AT WHICH SAMPLE WAS LOST DURING EXTRACTION
☐ -DEPTH AND LENGTH OF CORE RUN
 DRIVING ENERGY - 140 -LB WEIGHT DROPPING 30 INCHES

DAMES & MOORE
PLATE A-1C

BORING 4

SURFACE ELEVATION 292 FEET

MOISTURE CONTENT IN %
 DRY DENSITY IN PCF
 BLOWS/FT. ON SAMPLER
 CORE AND % RECOVERY
 SAMPLES AND/OR CORES
 DEPTH IN FEET
 GRAPH SYMBOL
 LETTER SYMBOL

DESCRIPTION

					MH	REDDISH BROWN GRAVELLY SANDY CLAYEY SILT WITH OCCASIONAL BASALTIC COBBLES AND BOULDERS (STIFF)
		78		⊗	2	
28	91	16		⊗	4	
					6	
		96/6"		□	8	GRAY SLIGHTLY FRACTURED DENSE BASALT, HARD
		100%		□		BECOMES VESICULAR
		0%		□	10	BECOMES HIGHLY FRACTURED GENERALLY AT LOW ANGLES
		73%		□	12	BECOMES LESS FRACTURED WITH VESICULES TO 1/2-INCH DIAMETER
		94%		□		

BORING COMPLETED AT 13.0 FEET ON 4-17-72
 NO GROUND WATER ENCOUNTERED

LOG OF BORINGS

NOTES:

- ⊗ -DEPTH AT WHICH UNDISTURBED SAMPLE WAS TAKEN
 - ⊗ -DEPTH AT WHICH DISTURBED SAMPLE WAS TAKEN
 - -DEPTH AT WHICH SAMPLE WAS LOST DURING EXTRACTION
 - I -DEPTH AND LENGTH OF CORE RUN
- DRIVING ENERGY - 140 -LB WEIGHT DROPPING 30 INCHES

DAMES & MOORE
 PLATE A-ID

REVISIONS BY DATE
 FILE 7591-002
 DATE 8-7
 CHECKED BY *John* 4-28-72

SOIL CLASSIFICATION CHART

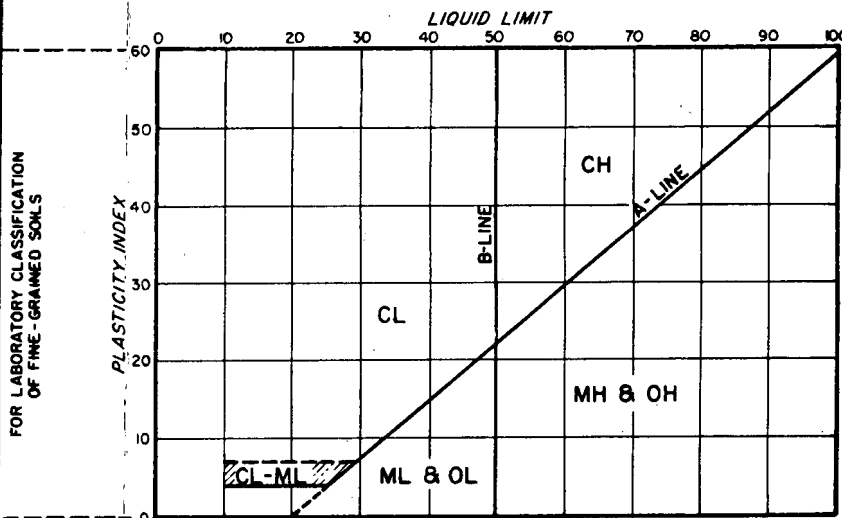
MAJOR DIVISIONS			GRAPH SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS				
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES				
				GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES				
		MORE THAN 50 % OF COARSE FRACTION <u>RETAINED</u> ON NO. 4 SIEVE	GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES			
					GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES			
	SAND AND SANDY SOILS	CLEAN SAND (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES				
				SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES				
		MORE THAN 50 % OF MATERIAL IS <u>LARGER</u> THAN NO. 200 SIEVE SIZE	SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND-SILT MIXTURES			
					SC	CLAYEY SANDS, SAND-CLAY MIXTURES			
				FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT <u>LESS</u> THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
								CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
	OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY							
MORE THAN 50 % OF MATERIAL IS <u>SMALLER</u> THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT <u>GREATER</u> THAN 50			MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS			
					CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS			
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS				
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS				

GRADATION CHART

MATERIAL SIZE	PARTICLE SIZE			
	LOWER LIMIT		UPPER LIMIT	
	MILLIMETERS	SIEVE SIZE*	MILLIMETERS	SIEVE SIZE*
SAND				
	FINE	.075	#200*	0.425
	MEDIUM	0.425	#40*	0.850
GRAVEL				
	FINE	0.850	#20*	2.00
	COARSE	2.00	#10*	4.75
COBBLES		75	3"	75
BOULDERS		75	12"	300

* U.S. STANDARD * CLEAR SQUARE OPENINGS

PLASTICITY CHART



NOTES:

1. DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE CLASSIFICATIONS.
2. WHEN SHOWN ON THE BORING LOGS, THE FOLLOWING TERMS ARE USED TO DESCRIBE THE CONSISTENCY OF COHESIVE SOILS AND THE RELATIVE COMPACTNESS OF COHESIONLESS SOILS.

COHESIVE SOILS		COHESIONLESS SOILS	
	(APPROXIMATE SHEARING STRENGTH IN KSF)		
VERY SOFT	LESS THAN .25	VERY LOOSE	THESE ARE USUALLY BASED ON AN EXAMINATION OF SOIL SAMPLES, PENETRATION RESISTANCE, AND SOIL DENSITY DATA.
SOFT	0.25 TO 0.5	LOOSE	
MEDIUM STIFF	0.5 TO 1.0	MEDIUM DENSE	
STIFF	1.0 TO 2.0	DENSE	
VERY STIFF	2.0 TO 4.0	VERY DENSE	
HARD	GREATER THAN 4.0		

SAMPLES

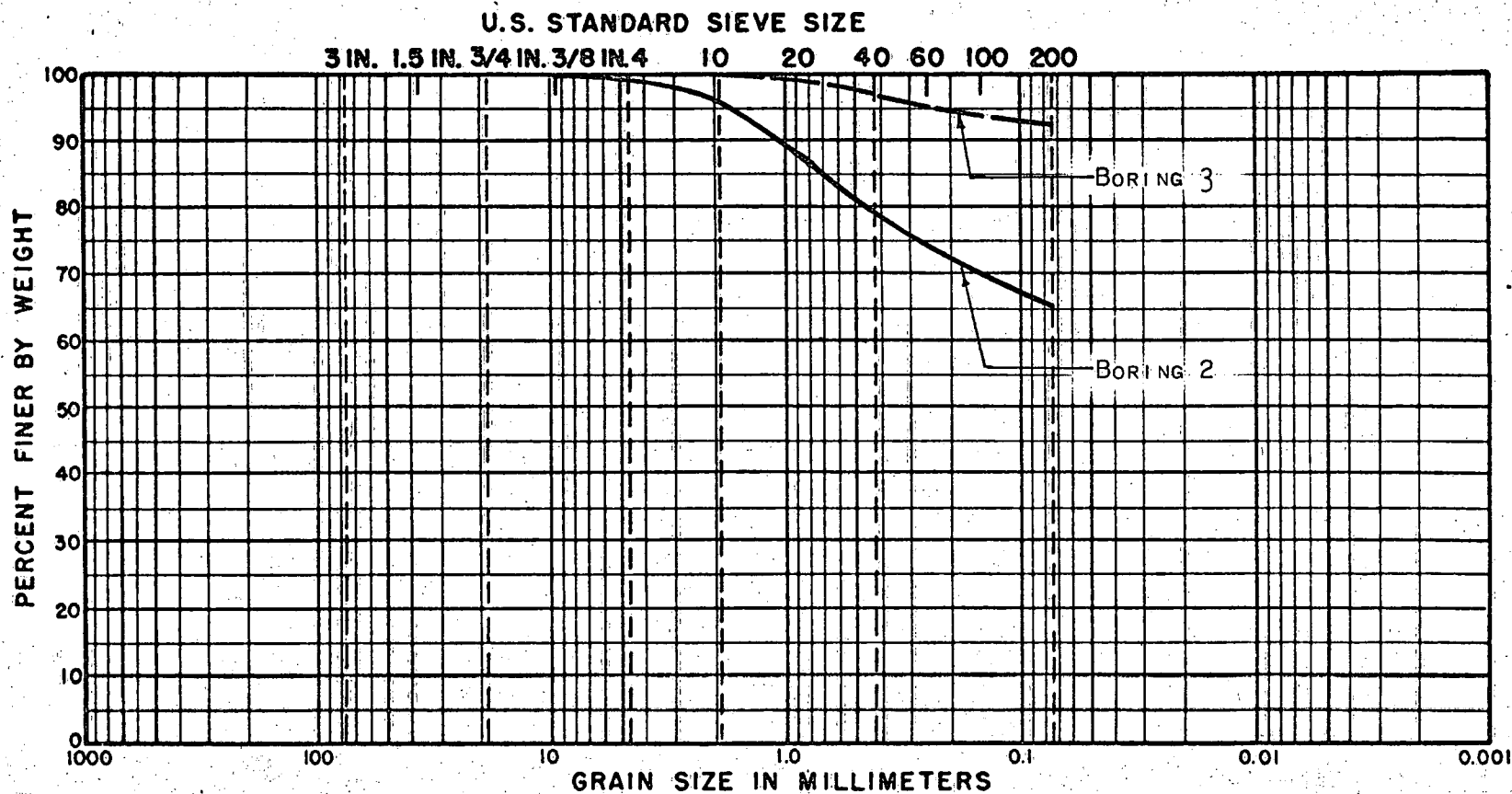
- INDICATES UNDISTURBED SAMPLE
⊗ INDICATES DISTURBED SAMPLE
□ INDICATES SAMPLING ATTEMPT WITH NO RECOVERY
I INDICATES LENGTH OF CORING RUN

NOTE: DEFINITIONS OF ANY ADDITIONAL DATA REGARDING SAMPLES ARE ENTERED ON THE FIRST LOG ON WHICH THE DATA APPEAR.

UNIFIED SOIL CLASSIFICATION SYSTEM

758 02
 BY AB DATE 4.28.72
 CHECKED BY WDW DATE 4.28.72

REVISION _____
 BY _____ DATE _____
 BY _____ DATE _____
 PLATE _____ OF _____



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

BORING	DEPTH	CLASSIFICATION		NAT. WC	LL	PL	PI	
2	4.5 FEET	MH	CLAYEY SILT	37.4	-	-	-	
3	0.5 FEET	MH	CLAYEY SILT	43.1	-	-	-	

GRADATION CURVES

